PPPD
Persistent Postural-Perceptual Dizziness

20191019 第一次頭暈讀書會

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黃子洲

Functional?

- In the 19th century:

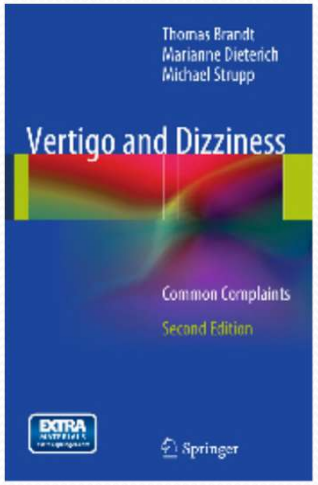
  "Arising from a change in the mode of action of an organ", unrelated to structural or cellular deficits

- In the 20th century:

  A synonym for psychogenic or psychosomatic

- Now:

  Different from psychiatric illness. It does not reflect a presumption of psychopathological abnormalities.



Vertigo syndromes	Frequency	
	n	%
Benign paroxysmal positioning vertigo	2,618	17.7
Somatoform phobic postural vertigo	2,157	14.6
Central vestibular vertigo	1,798	12.2
Vestibular migraine	1,662	11.2
Menière's disease	1,490	10.1
Vestibular neuritis	1,198	8.1
Bilateral vestibulopathy	1,067	7.2
Vestibular paroxysmia	569	3.9
Other psychogenic forms of vertigo	453	3.1
Perilymph fistula	83	0.6
Unclear vertigo syndromes	408	2.8
Other disorders[a]	1,287	8.8
Total number of patients	14,790	

47.1%

Table 1.1 Relative frequency of different vertigo syndromes diagnosed in our interdisciplinary special outpatient clinic of dizziness (*n*= 14,790 patients)

Brandt T, Dieterich M, Strupp M. Vertigo and Dizziness: Common Complaints. London: Springer; 2013

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PPPD

Persistent Postural-Perceptual Dizziness

持續姿勢知覺性頭暈

Historical background

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Diagnostic criteria for persistent postural-perceptual dizziness (PPPD): Consensus document of the committee for the Classification of Vestibular Disorders of the Bárány Society

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Abstract. This paper presents diagnostic criteria for persistent postural-perceptual dizziness (PPPD) to be included in the

The term PPPD is new, but the disorder is not.

upright posture, active or passive movement, and exposure to moving or complex visual stimuli. PPPD may be precipitated by conditions that disrupt balance or cause vertigo, unsteadiness, or dizziness, including peripheral or central vestibular disorders, other medical illnesses, or psychological distress. PPPD may be present alone or co-exist with other conditions. Possible subtypes await future identification and validation. The pathophysiologic processes underlying PPPD are not fully known. Emerging research suggests that it may arise from functional changes in postural control mechanisms, multi-sensory information processing, or cortical integration of spatial orientation and threat assessment. Thus, PPPD is classified as a chronic functional vestibular disorder. It is not a structural or psychiatric condition.

Keywords: Chronic subjective dizziness, phobic postural vertigo, space motion discomfort, visual vertigo, classification, Bárány Society

J Vestib Res. 2017;27:191-208.

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Persistent postural-perceptual dizziness (PPPD): a common, characteristic and treatable cause of chronic dizziness

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ABSTRACT

Persistent postural-perceptual dizziness (PPPD) is a newly defined diagnostic syndrome that unifies key features of chronic subjective dizziness, phobic postural vertigo and related disorders. It describes a common chronic dysfunction of the vestibular system and brain that produces persistent dizziness, non-spinning vertigo and/or unsteadiness. The disorder constitutes a long-term maladaptation to a neuro-otological, medical or psychological event that triggered vestibular symptoms, and is usefully considered within the spectrum of other functional neurological disorders. While diagnostic tests and conventional imaging usually remain negative, patients with PPPD present in a characteristic way that maps on to positive diagnostic criteria. Patients often develop secondary functional gait disorder, anxiety, avoidance behaviour and severe disability. Once recognised, PPPD can be managed with effective communication and tailored treatment strategies, including specialised physical therapy (vestibular rehabilitation), serotonergic medications and cognitive-behavioural therapy.

INTRODUCTION

Persistent postural-perceptual dizziness (PPPD) is a chronic functional disorder of the nervous system, characterised by non-spinning vertigo and perceived unsteadiness (see box 1 for diagnostic criteria[1]). The symptoms are exacerbated when patients assume upright postures and in situations with complex or moving visual stimuli (figure 1). The most common provocations are benign circumstances such as standing, walking, looking at traffic or sitting in a busy restaurant, which may be perceived as noxious or threatening. Symptoms of PPPD may be alleviated transiently in moments of distraction and may flare fleetingly without apparent provocation. PPPD is precipitated by episodes of vertigo or unsteadiness of vestibular, neurological or psychiatric origin. These triggers appear to induce involuntary utilisation of high-demand postural control strategies and an over-reliance on visual stimuli for spatial orientation. An initial period of high anxiety and excessive vigilance about the acute physical symptoms appears to perpetuate these reflexive processes, which are then inadequately mollified by top-down interactions among cortical vestibular, visual and threat assessment networks.[2–4] Maladaptive cognitive-behavioural responses commonly add secondary psychological and functional morbidity, such as fear of falling, anxiety or depressive disorders, and functional gait abnormalities. However, PPPD persists independently of any lesional or structural disease.

Different aspects of the disorder can dominate the clinical presentation, such as the primary symptoms of dizziness, unsteadiness and hypersensitivity to self-motion or complex visual stimuli, or the secondary complications of phobic avoidance of provocative situations and functional gait abnormalities. This can lead patients to different medical specialties (otolaryngology, psychiatry, neurology). Historically, the varied presentations resulted in the definitions of various overlapping nosological predecessors of PPPD, such as phobic postural vertigo, space–motion discomfort, visual vertigo, chronic subjective dizziness, psychogenic gait disorder and others.[3 5] Arguments for differentiation of these disorders remain valid, but PPPD has recently emerged as a unifying and diagnostically unambiguous

Linked
► http://dx.doi.org/10.1136/practneurol-2017-001817
CrossMark
To cite: Popkirov S, Staab JP, Stone J. *Pract Neurol* 2018;**18**:5–13.

In the 1870s

Syndromes of dizziness and discomfort in motion rich environments, accompanied by autonomic arousal, anxiety, and avoidance of provocative circumstances

- Benedikt: ***Platzschwindel*** (vertigo in a plaza or square)
- Cordes: ***Platzangst*** (fear in a plaza or square)

M. Benedikt, Über "Platzschwindel," *Allgemeine Wien Medizin Zeitschrift* 15 (1870), 488–490.
E. Cordes, Die Platzangst (Agoraphobie), Symptom einer Ersch öpfungsparese, Zeitschrift für sychiatrie, *Berlin* 3(1872), 521–574.

European and American physicians added commentary:

- Otologic diseases precipitate agoraphobia, especially with pre-existing anxiety
- But…

Neurologic or Psychiatric?

Early in 20th century

Platzschwindel and ***Platzangst***

- Otology, neurology, and psychiatry matured into separate specialties
- Platzschwindel and Platzangst faded from use

Agoraphobia

Agoraphobia DSM-5

A. Marked fear or anxiety about two (or more) of the following five situations:
   1. Using public transportation such as automobiles, buses, trains, ships or planes.
   2. Being in open spaces such as parking lots, marketplaces or bridges.
   3. Being in enclosed places such as shops, theaters, or cinemas.
   4. Standing in line or being in a crowd.
   5. Being outside of the home alone.

E. The fear or anxiety is out of proportion to the actual danger posed by the agoraphobic situations and to the sociocultural context.

F. The fear, anxiety, or avoidance is persistent, typically lasting for six months or more.

- Agoraphobia became a psychiatric disorder, **losing its space and motion context**

symptoms are not confined to specific phobia, situational type; do not involve only social situations as in social anxiety disorder; and are not related exclusively to obsessions as in obsessive-compulsive disorder, perceived effects of flaws in physical appearance as in body dysmorphic disorder, reminders of traumatic events as in posttraumatic stress disorder, or fear of separation as in separation anxiety disorder.

In 1980s

Investigations in larger number of patients began.

- **Phobic postural vertigo**

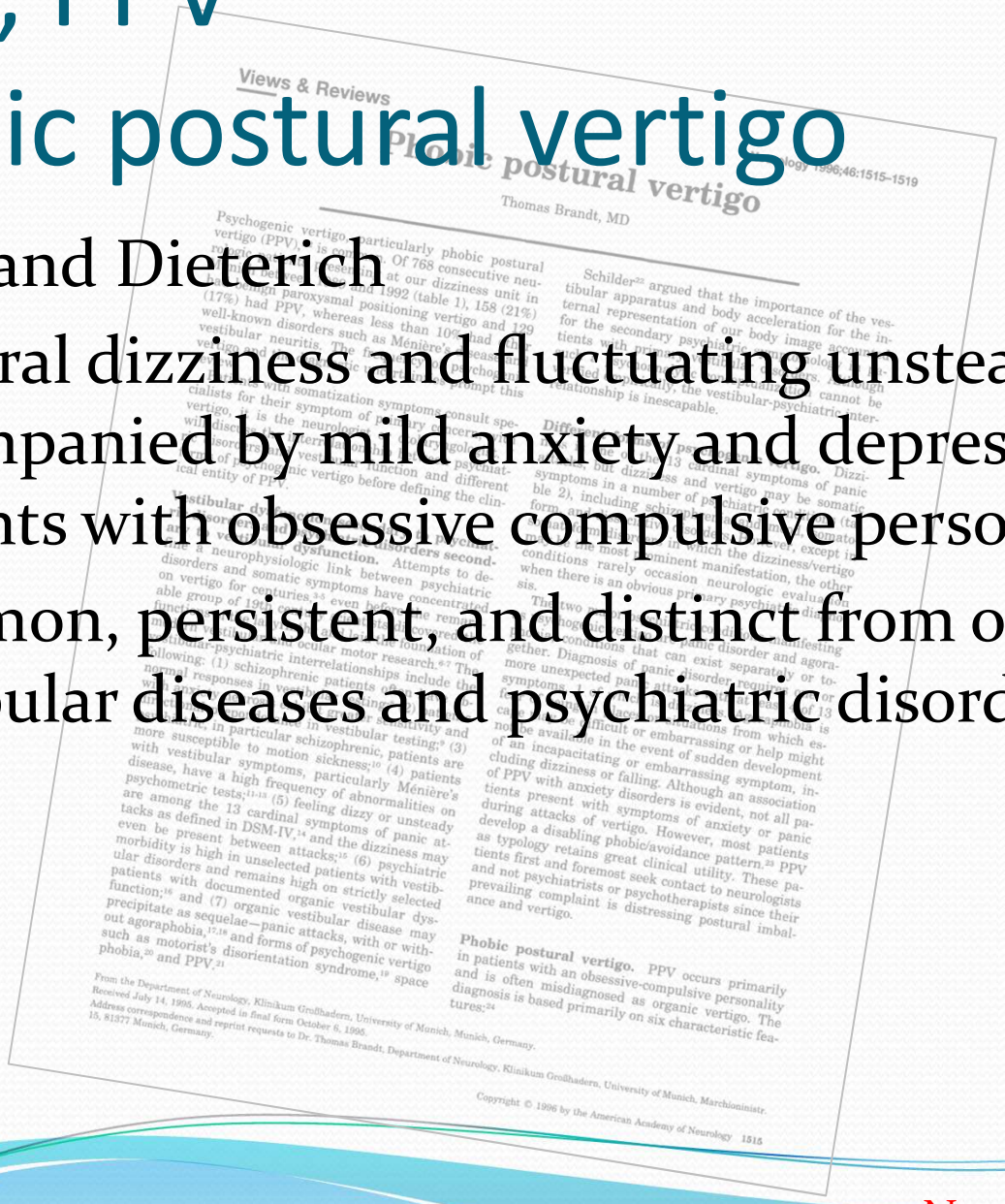
  Thomas Brandt, Marianne Dieterich.
- **Space-motion discomfort**

  Rolf Jacob, et al.
- **Visual vertigo**

  Adolfo Bronstein.
- **Chronic subjective dizziness**

  Jeffrey Staab, et al.

1986, PPV
Phobic postural vertigo


Views & Reviews

Phobic postural vertigo

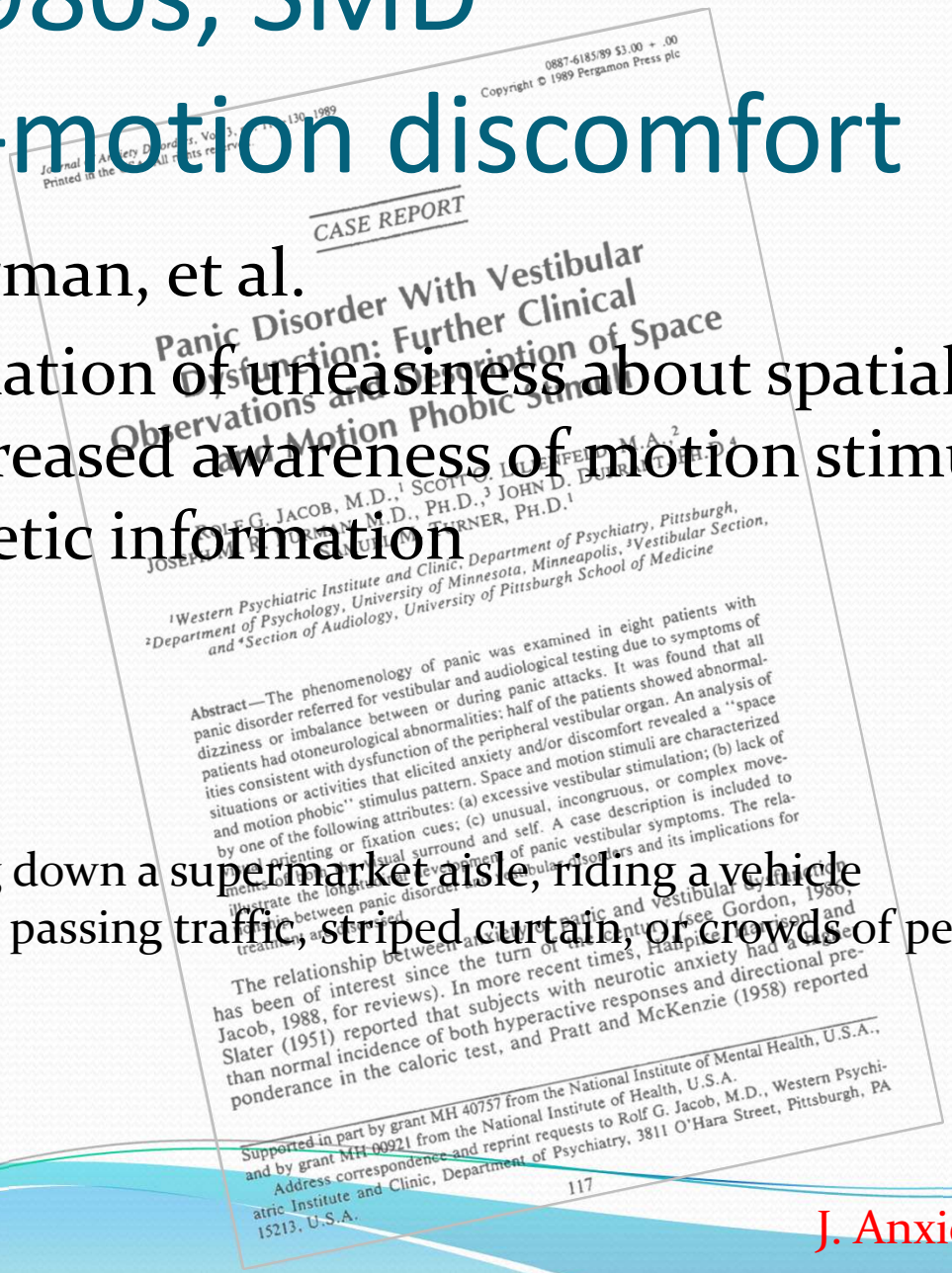
Thomas Brandt, MD

Brandt and Dieterich

- Postural dizziness and fluctuating unsteadiness accompanied by mild anxiety and depression in patients with obsessive compulsive personality traits
- Common, persistent, and distinct from other vestibular diseases and psychiatric disorders

Neurology.1996;46:1515-1519

Mid 1980s, SMD
Space-motion discomfort



CASE REPORT

Panic Disorder With Vestibular Dysfunction: Further Clinical Observations and Description of Space and Motion Phobic Stimuli

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Abstract—The phenomenology of panic was examined in eight patients with panic disorder referred for vestibular and audiological testing due to symptoms of dizziness or imbalance between or during panic attacks. It was found that all patients had otoneurological abnormalities; half of the patients showed abnormalities consistent with dysfunction of the peripheral vestibular organ. An analysis of situations or activities that elicited anxiety and/or discomfort revealed a "space and motion phobic" stimulus pattern. Space and motion stimuli are characterized by one of the following attributes: (a) excessive vestibular stimulation; (b) lack of orienting or fixation cues; (c) unusual, incongruous, or complex movement of visual surround and self. A case description is included to illustrate the longitudinal development of panic vestibular symptoms. The relationship between panic disorder and vestibular disorders and its implications for treatment are discussed.

The relationship between anxiety and vestibular dysfunction has been of interest since the turn of the century (see Gordon, 1986; Jacob, 1988, for reviews). In more recent times, Hampton, Morrow, and Slater (1951) reported that subjects with neurotic anxiety had a higher than normal incidence of both hyperactive responses and directional preponderance in the caloric test, and Pratt and McKenzie (1958) reported

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- Combination of uneasiness about spatial orientation and increased awareness of motion stimuli, visual or kinesthetic information

Walking down a supermarket aisle, riding a vehicle
Viewing passing traffic, striped curtain, or crowds of people

J. Anxiety Disord.1989:3;117-130

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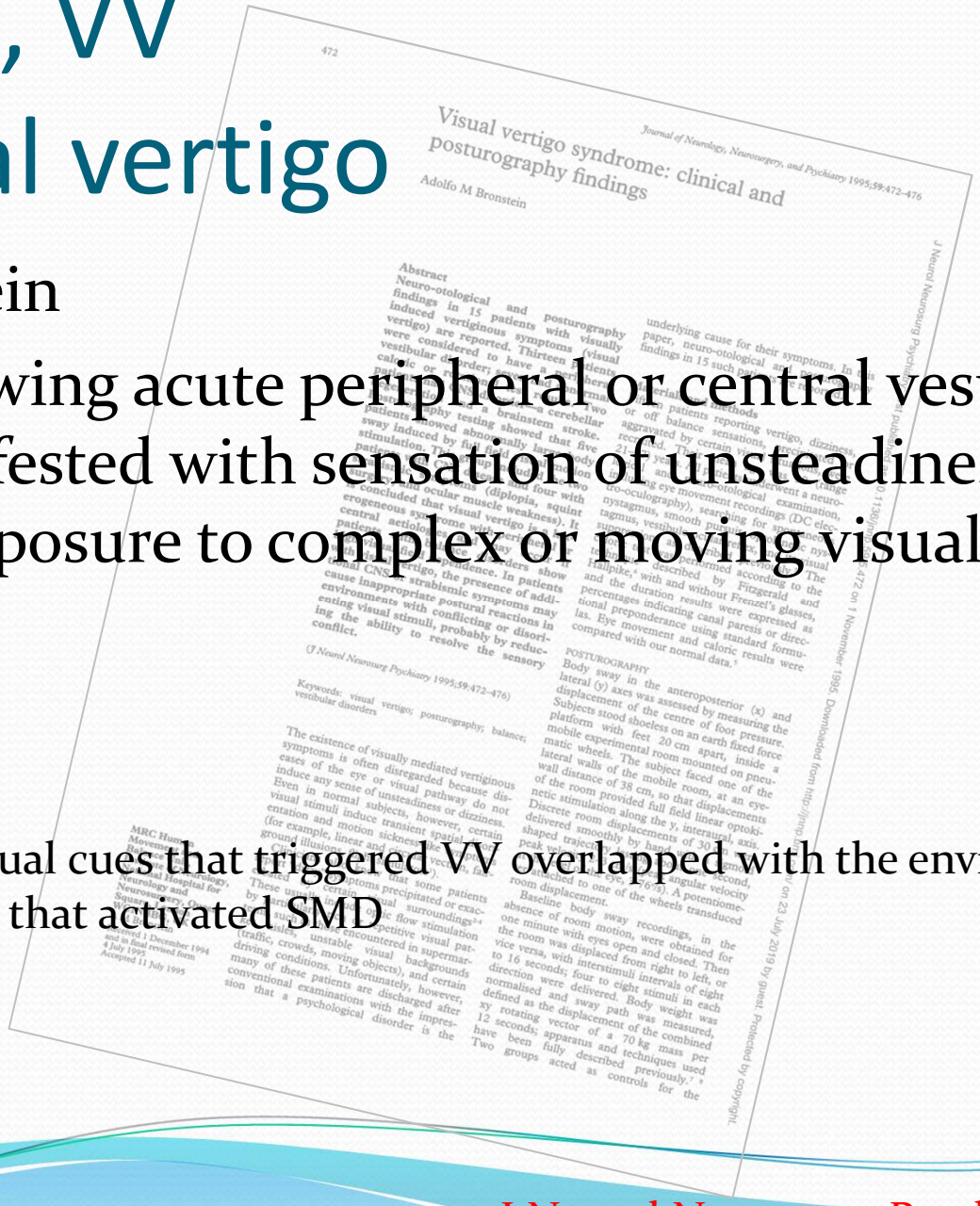
1995, VV
Visual vertigo



Visual vertigo syndrome: clinical and posturography findings

Adolfo M Bronstein

Bronstein

- Following acute peripheral or central vestibular losses, manifested with sensation of unsteadiness or dizziness on exposure to complex or moving visual stimuli

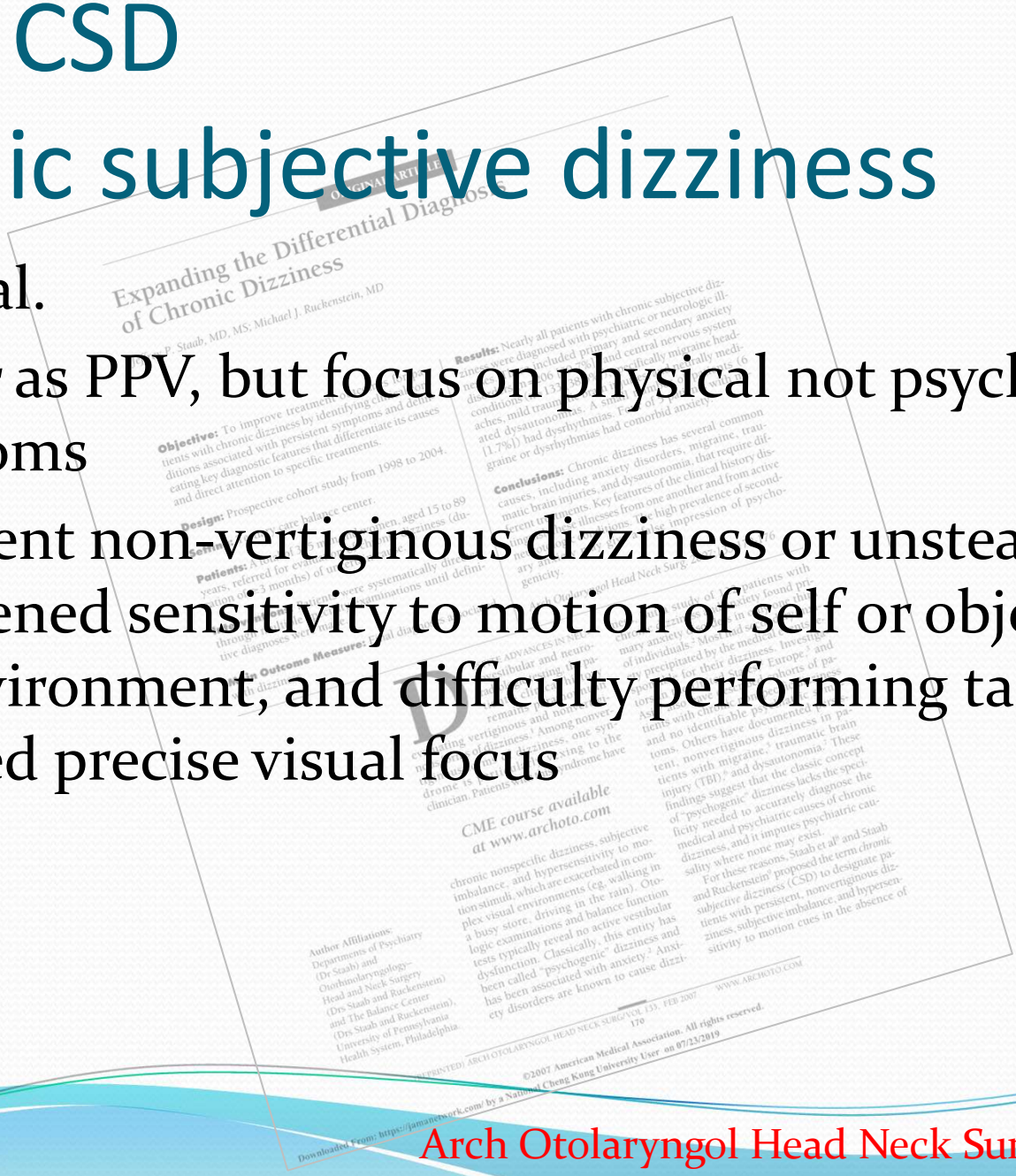
The visual cues that triggered VV overlapped with the environmental stimuli that activated SMD

J Neurol Neurosurg Psychiatry.1995;59:472–476.

2004, CSD
Chronic subjective dizziness

Staab et al.

- Similar as PPV, but focus on physical not psychological symptoms
- Persistent non-vertiginous dizziness or unsteadiness, heightened sensitivity to motion of self or objects in the environment, and difficulty performing tasks that required precise visual focus


Expanding the Differential Diagnosis of Chronic Dizziness

CME course available at www.archoto.com

Arch Otolaryngol Head Neck Surg.2007;133:170-6.

	PPV [13]	SMD [39]	VV [15]	CSD [79, 81]
Primary Symptoms (criteria A.1–3)				
Dizziness	✓✓	✓	✓✓ [22, 23]	✓✓
Unsteadiness	✓✓	✓✓	✓✓	✓✓
Non-spinning vertigo	✓✓	✓✓	✓✓	✓
Temporal profile (Criteria A.1–3)				
	Fluctuating with momentary flares	Situational (provoked)	Situational (provoked), Persistent [23]	Persistent with diurnal variability [27]
Provocative factors (Criteria B.1–3)				
Upright posture	✓✓			✓ [75]
Active or passive motion	✓	✓	✓	✓✓
Moving visual stimuli or complex patterns	✓	✓	✓✓	✓✓
Precipitants (Criterion C.1)				
Vestibular syndromes	✓	✓	✓	✓
Other medical illnesses	✓			✓
Psychological distress	✓	✓		✓
Course of illness (Criteria C.1.a-b)				
	Long-standing, waxing/waning [18]	May be long-standing	May be long-standing	Chronic
Physical exam and laboratory findings (Criterion E)				
	Normal	Somatosensory dependence on posturography [41]	Central or peripheral vestibular deficits	Abnormalities related to comorbid conditions [75]
Features not incorporated into PPPD				
Anxiety	Part of PPV	Associated with SMD [41]	Associated with prolonged VV [23]	May be comorbid with CSD [80]
Depression	Part of PPV			May be comorbid with CSD [80]
Personality traits	Obsessive-compulsive traits are part of PPV			Neurotic, introverted traits may be risk factors for CSD [76]

J Vestib Res. 2017;27:191-208.

Journal of Vestibular Research 19 (2009) 1–13
DOI 10.3233/VES-2009-0343
IOS Press

Classification of vestibular symptoms: Towards an international classification of vestibular disorders

First consensus document of the Committee for the Classification of Vestibular Disorders of the Bárány Society

Alexandre Bisdorff[a,*], Michael Von Brevern[b], Thomas Lempert[c] and David E. Newman-Toker[d]
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[c]*Vestibular Research Group Berlin, Department of Neurology, Schlosspark-Klinik, Berlin, Germany*
[d]*Department of Neurology, The Johns Hopkins University School of Medicine, Baltimore, MD 21287, USA*

On behalf of the Committee for the Classification of Vestibular Disorders of the Bárány Society: Pierre Bertholon, Alexandre Bisdorff, Adolfo Bronstein, Herman Kingma, Thomas Lempert, Jose Antonio Lopez Escamez, Måns Magnusson, Lloyd B. Minor, David E. Newman-Toker, Nicolás Pérez, Philippe Perrin, Mamoru Suzuki, Michael von Brevern, John Waterston and Toshiaki Yagi

Having structured criteria for diagnosis is obviously mandatory for disciplines which rely heavily on symptom-driven syndromic diagnosis, such as psychiatry and headache, where often there is no histopathologic, radiographic, physiologic, or other independent diagnostic standard available.

meeting of the Bárány Society in Uppsala 2006. Its charge is to promote development of an implementable

in areas of medicine such as epilepsy and rheumatolo-

Interestingly, not only scientific and therapeutic progress but also public awareness of psychiatric and headache disorders has vastly increased after the introduction of the Diagnostic and Statistical Manual of Mental Disorders (DSM) by the American Academy of Psychiatry and the International Classification of Headache Disorders (ICHD) by the International Headache Society (IHS).

J Vestib Res. 2009;19:1-13

International classification of vestibular disorders (ICVD)

Vestibular symptoms	*J Vestib Res*.2009;19:1–13.
Vestibular migraine	*J Vestib Res*.2012;22:167–172.
Menière's disease	*J Vestib Res*.2015;25:1–7.
BPPV	*J Vestib Res*.2015;25:105–117.
Vestibular paroxysmia	*J Vestib Res*.2016;26:409–415.
PPPD	*J Vestib Res*.2017;27:191–208.

Journal of Vestibular Research 27 (2017) 191–208
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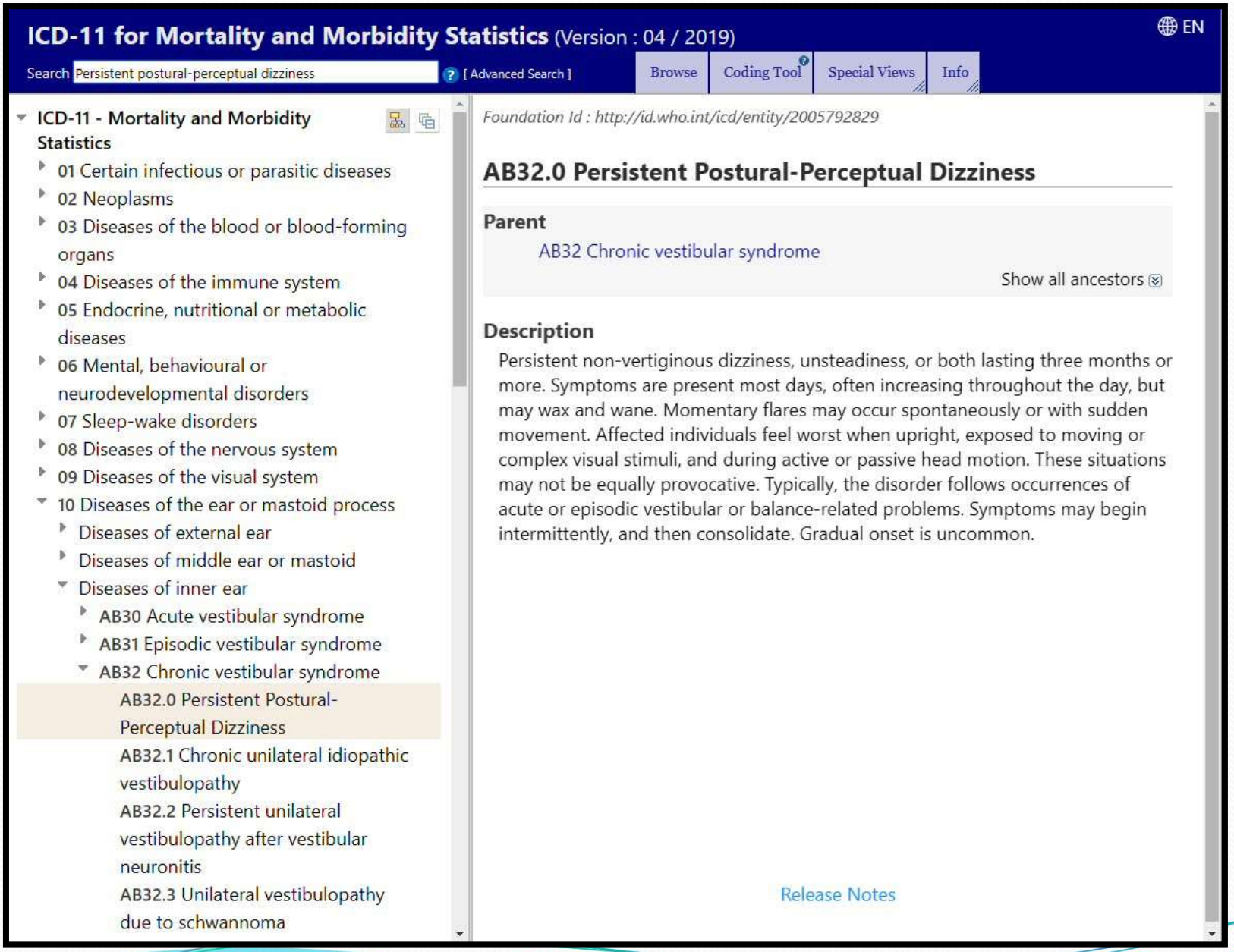
2 psychiatrists
1 expert in psychosomatic medicine
1 otologist
1 neurologist
2 senior neuro-otologists

From 3 continents (Europe, Asia, North America)

J Vestib Res. 2017;27:191-208.

Persistent Postural-Perceptual Dizziness (PPPD)

Persistent non-vertiginous **dizziness**, unsteadiness, and non-spinning vertigo that are exacerbated by **postural** challenges and **perceptual** sensitivity to space-motion stimuli.



Diagnostic criteria

Diagnostic Criteria for PPPD

A. One or more symptoms of dizziness, unsteadiness, or non-spinning vertigo are present on most days for 3 months or more.
   1. Symptoms last for prolonged (hours-long) periods of time, but may wax and wane in severity.
   2. Symptoms need not be present continuously throughout the entire day.

B. Persistent symptoms occur without specific provocation, but are exacerbated by three factors:
   1. Upright posture,
   2. Active or passive motion without regard to direction or position, and
   3. Exposure to moving visual stimuli or complex visual patterns.

C. The disorder is precipitated by conditions that cause vertigo, unsteadiness, dizziness, or problems with balance including acute, episodic, or chronic vestibular syndromes, other neurologic or medical illnesses, or psychological distress.
   1. When the precipitant is an acute or episodic condition, symptoms settle into the pattern of criterion A as the precipitant resolves, but they may occur intermittently at first, and then consolidate into a persistent course.
   2. When the precipitant is a chronic syndrome, symptoms may develop slowly at first and worsen gradually.

D. Symptoms cause significant distress or functional impairment.

E. Symptoms are not better accounted for by another disease or disorder.

Diagnostic Criteria for PPPD

A. One or more symptoms of dizziness, unsteadiness, or non-spinning vertigo are present on most days for 3 months or more.
   1. Symptoms last for prolonged (hours-long) periods of time, but may wax and wane in severity.
   2. Symptoms need not be present continuously throughout the entire day.

Symptoms

- **Dizziness**: non-motion sensations of disturbed or impaired spatial orientation
- **Unsteadiness**: feelings of being unstable while standing or walking
- **Internal non-spinning vertigo**: false or distorted sensations of swaying, rocking, bobbing or bouncing of oneself
- **External non-spinning vertigo**: false or distorted sensations of swaying, rocking, bobbing or bouncing of the surroundings

Tilting and sliding sensations are not typical symptoms of PPPD

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Temporal pattern of symptoms

- Symptoms must be present for more than 15 of every 30 days.
- Most experience symptoms every day or nearly every day.

Temporal pattern of symptoms

- Momentary flares may occur, but not in all patients.
- Momentary flare-ups alone do not fulfill this criterion.

Diagnostic Criteria for PPPD

B. Persistent symptoms occur without specific provocation, but are exacerbated by three factors:

1. Upright posture,
2. Active or passive motion without regard to direction or position, and
3. Exposure to moving visual stimuli or complex visual patterns.

Exacerbating factors

- Three exacerbating factors must be discernible in the **clinical history**.
- Patients may try to avoid these factors. That may be considered in fulfillment of criterion.
- Symptoms may delay after exposure.

Exacerbating factors

- **Upright posture** means standing or walking
- **Active motion** refers to a person's self-generated movements. **Passive motion** refers to a person being moved by conveyances or other beings.
- **Visual stimuli** may be large objects in the visual environment or smaller objects viewed at a close distance.

Visual stimuli

Environments contain

- Full field visual flow (passing traffic, large crowds)
- Large complex patterns (busy carpeting)
- Wide-open spaces with distant or indistinct visuospatial reference points (large atria)
- Smaller visual targets

Diagnostic Criteria for PPPD

C. The disorder is precipitated by conditions that cause vertigo, unsteadiness, dizziness, or problems with balance including acute, episodic, or chronic vestibular syndromes, other neurologic or medical illnesses, or psychological distress.

1. When the precipitant is an acute or episodic condition, symptoms settle into the pattern of criterion A as the precipitant resolves, but they may occur intermittently at first, and then consolidate into a persistent course.
2. When the precipitant is a chronic syndrome, symptoms may develop slowly at first and worsen gradually.

Precipitants

The most common precipitating conditions are

- peripheral or central vestibular disorders (25–30%)
- attacks of vestibular migraine (15–20%)
- panic attacks or anxiety that manifest prominent dizziness (15% each)
- concussive injuries of the brain or whiplash injuries of the neck (10–15%)
- autonomic disorders (7%).

Precipitants

- Other conditions that can produce vertigo, unsteadiness or dizziness, or altering balance function (e.g., cardiac dysrhythmias, adverse drug reactions) (collectively ~ 3%).

- Most precipitants are acute or episodic in nature.
- Once the disorder is developed, symptoms persist without the need for ongoing precipitants.

Precipitants

- Precipitants may develop insidiously that patients are less likely to report a distinct onset.
- It is not possible to identify a specific precipitant in every case.
- When a specific precipitant cannot be identified, re-evaluation is indicated.

Diagnostic Criteria for PPPD

D. Symptoms cause significant distress or functional impairment.

E. Symptoms are not better accounted for by another disease or disorder.

Co-existed diseases

- PPPD may co-exist with other disorders.
- Evidence of another active illness does not necessarily exclude a diagnosis of PPPD.

Diagnostic Criteria for PPPD

A. One or more symptoms of dizziness, unsteadiness, or non-spinning vertigo are present on most days for 3 months or more.
   1. Symptoms last for prolonged (hours-long) periods of time, but may wax and wane in severity.
   2. Symptoms need not be present continuously throughout the entire day.

B. Persistent symptoms occur without specific provocation, but are exacerbated by three factors:
   1. Upright posture,
   2. Active or passive motion without regard to direction or position, and
   3. Exposure to moving visual stimuli or complex visual patterns.

C. The disorder is precipitated by conditions that cause vertigo, unsteadiness, dizziness, or problems with balance including acute, episodic, or chronic vestibular syndromes, other neurologic or medical illnesses, or psychological distress.
   1. When the precipitant is an acute or episodic condition, symptoms settle into the pattern of criterion A as the precipitant resolves, but they may occur intermittently at first, and then consolidate into a persistent course.
   2. When the precipitant is a chronic syndrome, symptoms may develop slowly at first and worsen gradually.

D. Symptoms cause significant distress or functional impairment.

E. Symptoms are not better accounted for by another disease or disorder.

持續姿勢知覺性頭暈的診斷基準

A. 一或多項的頭暈、不穩、或非旋轉感覺的眩暈症狀，出現在大於3個月中大多數的日子
   1. 症狀持續時間長(數小時)，但是嚴重度可能時好時壞
   2. 症狀不必然在一整天內連續不斷的存在
B. 持續症狀不因特定誘因誘發，但可因下列三項因素惡化：
   1. 直立的姿勢
   2. 主動或被動的移動，不論其方向或位置，以及
   3. 曝露在移動的視覺刺激或是複雜的視覺圖案
C. 這疾患可因一些導致眩暈、不穩、頭暈或平衡障礙之急性、陣發性或慢性的前庭症候群、其他神經科或內科疾病或精神心理的困擾所引起
   1. 當引發因子是急性或陣發性狀態，隨著引發因子的緩解，症狀開始呈現出基準A的形態，但一開始可以是間歇性的發生，然後成形為持續的病程
   2. 當引發因子是慢性症候群，一開始症狀可能慢慢地發生，再逐漸惡化
D. 症狀造成顯著的困擾或功能障礙
E. 症狀無法歸因於另一個更合適的疾病或疾患

Probable (Provisional) PPPD

- Not enough published data to define a clinically meaningful probable PPPD.
- Caution in applying the diagnosis of PPPD to patients who do not fulfill all five of its diagnostic criteria

Precipitants and PPPD

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Clinical course

Acute to chronic

- Acute symptoms of precipitating conditions remits
- Characteristic chronic symptoms of PPPD develops
- Patients do not experience symptom-free intervals.

e.g. acute vestibulitis

Clinical course

Stuttering to chronic

- Onset of short-lived, recurrent events of precipitants
- Patients may experience PPPD-like symptoms during the period
- Recurrences settle into a persistent course

e.g. BPPV, migraine, or panic

Clinical course

Chronic to chronic

- Chronic course of precipitants
- PPPD symptoms develop gradually, almost imperceptibly, then worsen slowly

e.g. GAD, degenerative disease involving balance

Making diagnosis and differential diagnosis

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Making a diagnosis of PPPD

- By gathering clinical history relevant to Criteria A-D.
- No findings on physical examination.
- Lab tests help to determine if PPPD is the best diagnosis.
- Abnormal finding on PE or laboratory testing does not exclude a diagnosis of PPPD.
- **Not a diagnosis by exclusion.**

Differential diagnosis

- Chronic sequelae of acute precipitants
- Recurrent attacks of episodic precipitants
- Ongoing manifestations of chronic precipitants
  - Chronic anxiety and depressive disorders
  - Post concussive syndrome
- Other chronic vestibular syndromes
  - Bilateral vestibulopathy
  - Chronic neurological disorders
  - Mal de debarquement syndrome
- Adverse effects of medications
- Other functional forms of vestibular symptoms

Epidemiology

Epidemiology

- No data so far.
- PPV and CSD: 15-20% among all dizziness patients in a tertiary care center.
- **Most common** diagnoses among young adults and the **second most common** among all adults, trailing only BPPV.
- The average age of patients is mid-40s.
- Female predominance.

Incidence of PPPD

Estimated from studies followed patients after bouts of vestibular disorders (e.g., vestibular neuritis, BPPV, vestibular migraine, Menière's disease).

- PPPD-like chronic dizziness or persistent visual vertigo in about 25% of patients after 3-12 months.
- Long-term follow-up study of PPV found only a minority experienced spontaneous resolution.
- Most had a waxing and waning course and three-quarters developed anxiety and depressive comorbidity.

Possible Pathophysiology

Pathophysiologic processes

Risk factor:

- Anxiety trait

Initial process:

- High levels of anxiety and vigilance about acute symptoms during precipitating events

Maintaining mechanism:

- Alternations in postural control strategies
- Shifts in multi-sensory integration
- Reduced cortical integrating of spatial orientation and threat assessment networks

Risk factors

- Obsessive compulsive personality traits
- Anxiety-related personality trait of neuroticism and introversion.

In contrast

- Resilience, optimism and beliefs that life is meaningful and manageable

Initial reactions

- Studies found **high anxiety** during and after bouts of vertigo predicted continued dizziness months later.
- **Initial psychological responses had far greater effects on long-term outcomes** than the initial or subsequent states of patients' peripheral vestibular functioning or vestibulo-ocular reflexes.

Alterations in postural control

- Normal people uses this **high demand postural control strategy** only in challenging balance situations such as standing at heights.
- PPV patients manifested a high frequency, low amplitude postural sway related to co-contraction of lower leg muscles when standing at rest

Visual dependence

- Tendency to rely on visual information for spatial orientation
- Study showed patients who had **persistent dizziness followed acute vertigo had greater visual dependence** than those who recovered without chronic symptoms.

Worse recovery was associated with a combination of increased **visual dependence**, autonomic arousal, **anxiety/depression**, and fear of bodily sensations, but not with **vestibular variables**.

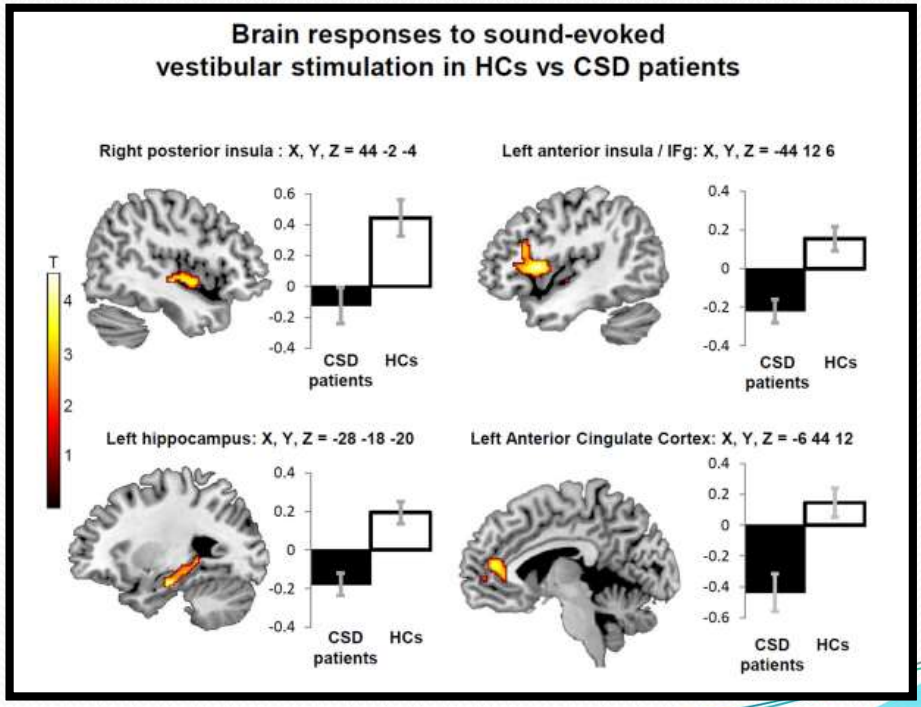
Ann Clin Transl Neurol. 2017;22:340-346

Changes in activity and connectivity of crucial brain regions

fMRI study:

CSD patients (compared to normal) showed reduced stimulus-related activity in:

- Parieto-insular vestibular cortex (PIVC)
- Anterior insula
- Inferior frontal gyrus, hippocampus
- Anterior cingulate cortex



Front Behav Neurosci. 2015; 9: 334.

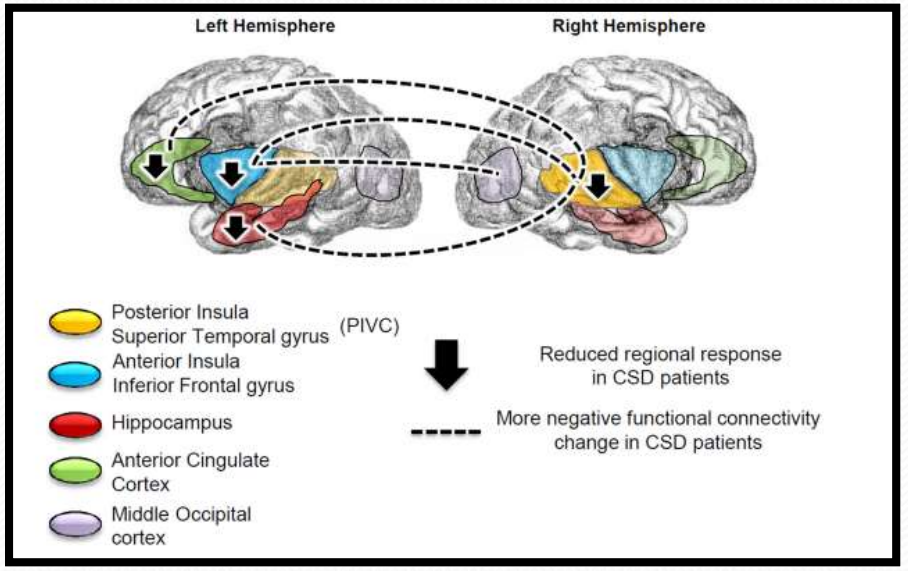
Changes in activity and connectivity of crucial brain regions

- These suggest brain areas responsible for **high level spatial orientation**, **multi-sensory integration**, and **threat assessment** may not be as active or well connected in patients with PPPD as in normal people, potentially leaving **lower level posture and gaze control** mechanisms poorly integrated with one another.

Changes in activity and connectivity of crucial brain regions

fMRI study shows more negative connectivity between the:

- PIVC and anterior insula
- Anterior cingulate cortex and hippocampus
- Anterior insula and middle occipital cortex



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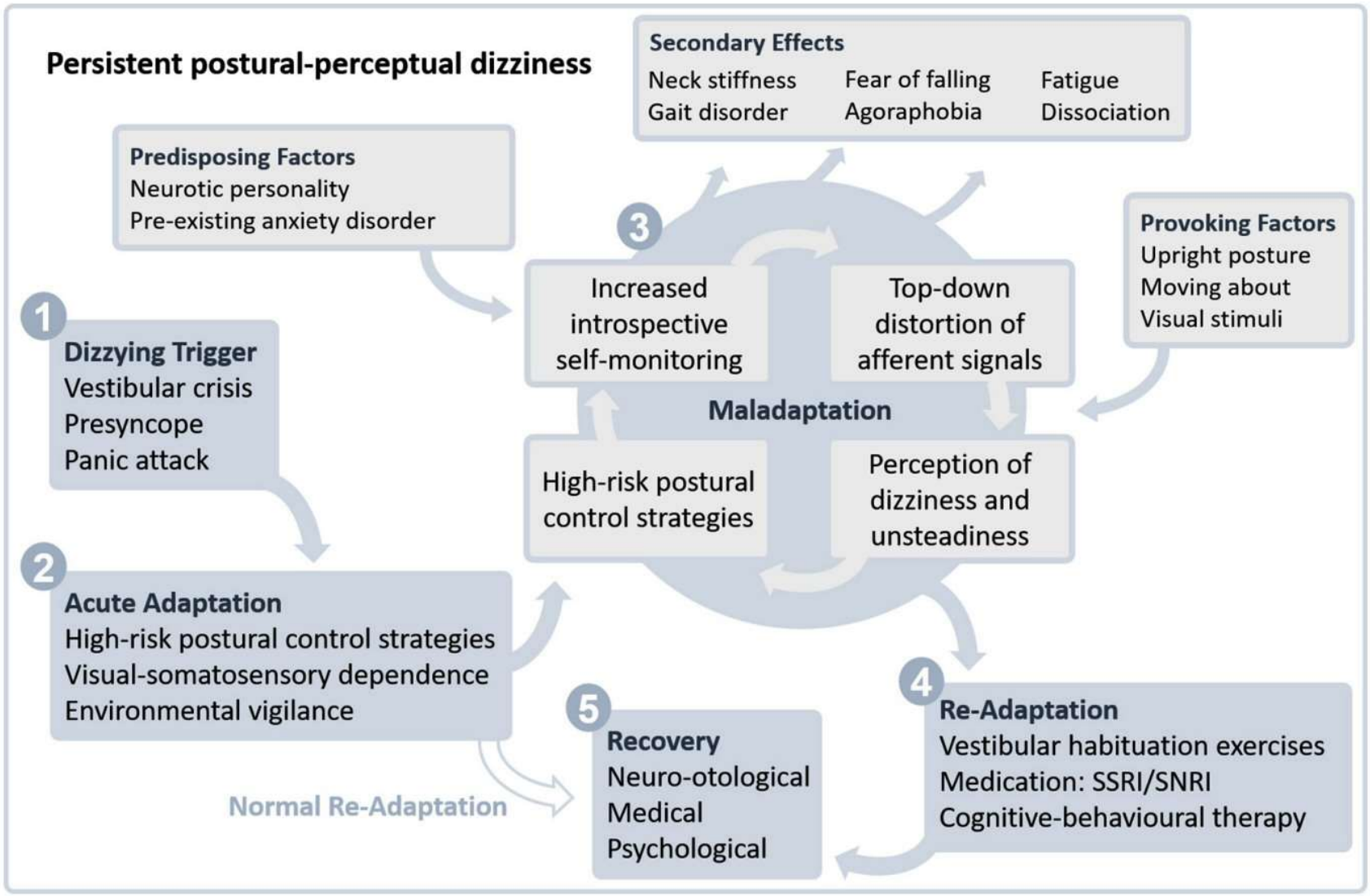
Failure of higher cortical mechanisms

- Activity and connectivity between key cortical regions that **process space-motion information** (posterior insula, hippocampus) and **modulate threat response** (anterior cingulate cortex) are reduced.
- Underactive and insufficiently interactive cortical networks may **fail to suppress** the bottom-up influences of instinctive threat on postural control and spatial orientation leading to sustained use of high-risk strategies.

Three key mechanisms

- High-risk postural control strategies
- Shift in processing spatial orientation information to favor visual over vestibular inputs
- Failure of higher cortical mechanisms to modulate the first two processes



Pract Neurol 2017;0:1–10.

Treatment

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Treatment

- Communicating the diagnosis
- Vestibular rehabilitation
- Medical treatment
- Cognitive behavior therapy

Communicating the diagnosis

- Treatment starts with education of the patients
- Listing negative test result vs. giving patients the diagnostic name
- This also provides the background needed to introduce treatment options such as physiotherapy, medications, psychological therapy.

Persistent Posturo-Perceptual Dizziness (PPPD) (Functional Dizziness)

FACTSHEET

Dizziness is a common symptom in neurology and has lots of different causes

There are lots of different causes of dizziness - migraine, middle ear problems (vestibular disorders - like BPPV or labyrinthitis)- and drug side effects are all common ones.

Dizziness occuring as part of a functional disorder is also relatively common accounting for up to 20% of patients seen in a specialist dizziness clinic. When dizziness occurs as a functional disorder it is called

'Persistent Postural Perceptual Dizziness' (PPPD) or **Chronic Subjective Dizziness**

Other names for it include Visual Vertigo, Phobic Postural Vertigo, Functional Dizziness or Space and Motion Discomfort

PPPD has recently been defined by the World Health Organisation as

"Persistent non-vertiginous dizziness, unsteadiness, or both lasting three months or more.

Symptoms are present most days, often increasing throughout the day, but may wax and wane. Momentary flares may occur spontaneously or with sudden movement.

Affected individuals feel worst when upright, exposed to moving or complex visual stimuli, and during active or passive head motion. These situations may not be equally provocative.

Typically, the disorder follows occurrences of acute or episodic vestibular or balance-related problems. Symptoms may begin intermittently, and then consolidate."

Patterned carpets or places with a lot of sensory stimulation can make dizziness in PPPD worse

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Information leaflet taken from www.neurosymptoms.org
Page 1 Prepared by Dr Jon Stone, Consultant Neurologist, University of Edinburgh, UK. Jan 2016

Vestibular rehabilitation

- Some vestibular exercise, ping-pong, TaiChi
- Vestibular program aim at **fatiguing abnormal reflexive responses** to movement task and **reducing sensitivity** to visual stimuli

- https://vestibular.org/sites/default/files/page_files/Vestibular%20Rehabilitation_0.pdf

Medical treatment

SSRI and SNRI

- Multiple prospective, open-label clinical trials, but no randomized controlled trials.
- Response seems not to depend on the presence of psychiatric symptoms
- May need only half dosing for depression

Medical treatment

SSRI and SNRI

- Patients may be sensitive to side effects (1/5 quitting) as in other functional disorders.
- Try SSRI first, shift to another SSRI, then shift to SNRI
- Clinical response is usually seen after 8-12 weeks
- If effective, medication should be continued for at least 1 year
- Clinical experience with other classes of antidepressants has not been promising.

Cognitive-behavior therapy

- Limited experience
- Some small studies showed effect of CBT in PPPD.
- CBT would be expected to help patients with pronounced fear of falling or fear of dizziness since it can reduce similar problem in other anxiety disorders.

What we need to do

- Familiar with functional dizziness and PPPD
- Not shy away from a firm diagnosis
- Be aware of the treatment options